Contribution ID: **13** Type: **Oral**

Application of amine-functionalized magnesium ferrite nanoparticles in wastewater treatment

Sunday 27 November 2016 16:20 (15 minutes)

Magnesium ferrite ($MgFe_2O_4$) is one of the magnetic materials in spinel ferrite group which could be utilized for using in adsorbent applications due to their removability from medium solution by applying external magnetic field [1,2]. The capability of functionalization by grafting specific functional groups on their surfaces provide the possibility to synthesize the different types of magnetic nanoparticles for removing a large number of both organic and inorganic contaminants in wastewater [3]. Amongst many pollutants, heavy metal ions and dyes are considered as the crucial problems in wastewater. Thus, this present work focuses on using the synthesized magnesium ferrite nanoparticles as the effective heavy metal and dye nanoadsorbents. Mesoporous amine-functionalized $MgFe_2O_4$ nanoparticles ($MgFe_2O_4$–NH_2 NPs), with maximum magnetization of around 35 emu•g-1, were successfully synthesized and simultaneously functionalized under a refluxing condition by using ethanolamine as a surface modifier. The grafting of amine groups onto the $MgFe_2O_4$ NPs was clearly confirmed by the Fourier transform infrared spectrum. Adopting the $MgFe_2O_4$–NH_2 NPs as magnetic nanoadsorbents to remove heavy metal and dye from simulated wastewater is reported. Related to this aspect, the optimal adsorption conditions were carefully examined. It was found that the obtained materials exhibited excellent removal efficiency together with rapid adsorption [4].

References

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Session Classification: Falcon 1

Track Classification: Nanomaterials & nanostructures